

TITLE OF THE INVENTION

INFORMATION PROCESSING DEVICE AND PROGRAM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based upon and claims the  
5 benefit of priority from prior Japanese Patent  
Application No. 2003-085667, filed March 26, 2003, the  
entire contents of which are incorporated herein by  
reference.

BACKGROUND OF THE INVENTION

10 1. Field of the Invention

The present invention relates to an information  
processing device having a wireless communication  
function. In addition, the present invention relates  
to a program suitable for applying to a small  
15 electronic equipments such as a notebook-type personal  
computer and a PDA, etc., which are easy to carry and  
which have a wireless communication function.

2. Description of the Related Art

In general, an information processing device such  
20 as a personal computer comprises a network device such  
as a wired LAN device. The network device is used to  
connect the information processing device with the  
network. By connecting the information processing  
device with the network such as Internet, it becomes  
25 possible to acquire information from other computers on  
the network, and share the information between other  
computers. Many computers use operating systems which

support the network connection function. With this configuration, even if the user does not have technical knowledge concerning the network, the information processing device can be easily connected with the network such as Internet.

5 Recently, the small information processing equipments such as notebook-type personal computers and PDA have a function of finding access points of the wireless LAN which exist in the surroundings under the 10 system requirements, and performing a connection with the network (For instance, see Japanese Patent Application KOKAI Publication No. 10-89980).

15 These equipments find an access point which is communicable first when performing connection with the access point of the wireless LAN, and performing connection thereafter. However, in this case, a found ID and type, etc. of the access point cannot be easily identified.

#### BRIEF SUMMARY OF THE INVENTION

20 An aspect of the present invention provides an information processing device and a program in which a type etc. of a found access point can be easily identified and informed to the user when the access point is found. Another aspect of the present 25 invention provides an information processing device and a program which expands a useful function by recording and controlling the found access point.

An information processing device, having a communication function of performing a network connection via a wireless relay apparatus, according to an aspect of the present invention, is characterized by comprising: a first unit which finds the wireless relay apparatus; and a second unit which displays information, which is characterized according to identification information of the wireless relay apparatus when the first unit finds the wireless relay apparatus. The present invention can also be achieved by method, computer program and the like.

According to the present invention, for instance, in the portable information processing equipment, when finding, for instance, the access point of wireless LAN, which configures the wireless relay apparatus (when receiving the beacon sent from the access point) under the system requirements which does not specify the place, the identification information (for instance, SSID, BSSID, etc.) of the found access point is gathered under a predetermined condition and the finding frequency is updated. When finding the access point, for instance, the various messages can be displayed according to the finding frequency of the access point. In addition, as an extension of the function, it is possible to provide a function that the communication environment in the use place can be easily set based on the displayed information.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. 1 is a block diagram which shows a configuration of the entire network system to explain an outline of a function of an information processing device according to the embodiments of the present invention;

FIG. 2 is a figure to explain an operation of the information processing device under the communication environment shown in FIG. 1 according to the embodiments;

FIG. 3 is block diagram which shows a configuration of the information processing device according to the embodiments;

FIG. 4 is a figure which shows a configuration of a database according to the first embodiment of the present invention;

FIG. 5 is a figure which shows a processing procedure of an application concerning the communication service according to the first embodiment;

FIG. 6 is a figure which shows a configuration example of a database according to the second embodiment of the present invention;

FIG. 7 is a figure which shows a procedure of an application processing relating to the communication service according to the second embodiment;

FIG. 8A and FIG. 8B are figures which show

configuration examples of a character according to each of above-mentioned embodiments; and

FIG. 9A and FIG. 9B are figures which show a configuration example of a character according to each of above-mentioned embodiments.

5 DETAILED DESCRIPTION OF THE INVENTION

Hereinafter, embodiments of the present invention will be explained referring to the drawings.

FIG. 1 is a figure which shows an example of 10 a system configuration to explain an outline of a function of an information processing device according to the embodiment of the present invention. FIG. 2 is a figure which shows an operation example of a terminal under a communication environment in 15 the system configuration shown in FIG. 1.

The wireless LAN access areas A, B, and C each constitutes the communication network through the IP network 10 as shown in FIG. 1. The servers such as the printers, networks, and files and the wirelesses 20 LAN access points (AP) 20 are provided to the wireless LAN access areas A, B, and each C.

The terminal which is defined as the client is achieved by, for instance, the portable personal computer (PC) 30. The personal computer 30 has the 25 communication function of performing the network connection with the arbitrary equipments via the above-mentioned various servers and, furthermore, the IP

network 10 by being connected with the access point 20 in the wireless LAN access area by the wireless LAN.

According to the embodiment of the present invention, as shown in FIG. 2, when the personal computer 30 finds the access points 20 of the wireless LAN access areas A, B, and C, the personal computer 30 gathers the identification information on the found access point 20 under a predetermined condition (SSID and BSSID, etc.). Then, the personal computer 30 updates and controls the finding frequency of the found access point 20 on the database (DB) 31, and displays, for instance, various messages on the display unit 32 according to the finding frequency of the access point. The SSID (extended service set identity) is an ID (identification information) for grouping the access points etc. The BSSID (basic service set identity) is an ID for authenticating the communication terminal etc. in the MAC layer. The SSID and BSSID can be recognized by receiving the beacons (RB) sent from the access points 20, respectively.

The apparatus according to the first embodiment of the present invention has the following configuration. The display information for informing the user of the state (furthermore, for setting the found access point 20 to the usable environment) is made to a predetermined form and is prepared (held), when the access point 20 is found (i.e., when the beacon

(RB) sent from the access point 20 is received). And, when the access point 20 is found, for instance, the specific character (information window) as shown in FIG. 1, which can easily recognize the type of the access point prepared beforehand is displayed during the predetermined time period. In addition, the specific character is characterized and displayed according to the finding frequency of the access point in this case. For instance, the size and the color etc. of the display character are changed according to the finding frequency of the access point. Or, two or more different characters are provided for each stages corresponding to the finding frequency of the access point, and the character to be displayed is switched according to the finding frequency of the access point and is presented to the user. In addition, it becomes possible to set the optimal communication profile which suits the current communication environment along with the corresponding icon operation by defining the display character as an operation icon.

The device according to the second embodiment of the present invention has the following configuration. The database (DB) 31 storing the information associated with the access points 20, respectively, which can be found by the personal computer 30 is down-loaded to a predetermined storage area beforehand through the communication network. Then, when access point 20 is

found, information associated with the access point 20 is acquired from the database 31 and the corresponding information according to the finding frequency of the above-mentioned access point is characterized and

5 displayed during the predetermined time period.

For instance, when receiving the beacons (RB) from the access point (A) 20 in the wireless LAN access area A, service information corresponding to the finding frequency of the corresponding access point (A) 20 is

10 displayed. And, when receiving the beacons (RB) 20

from the access point (B) in the wireless LAN access area B, the peculiar advertisement information of the corresponding access point (B) 20 is displayed. When receiving the beacon (RB) from access point (C) 20 in

15 the wireless LAN access area C, if, for instance, the finding frequency of the corresponding access point (C)

20 is more than a predetermined value, it is judged whether a day is a birthday when the user has been registered beforehand. When the day is the birthday,

information of presentation and introduction etc. of birthday message and birthday present are displayed during the predetermined time period. In addition,

associating with, for instance, the above-mentioned finding frequency, information of a service according

25 to a time zone, morning/afternoon, week, day of the week, season, period, birthday, and weather, etc., and

the sale guide etc. are displayed during the

predetermined time period.

The finding frequency of the access point may be updated (incremented) by, for instance, the following any cases.

- 5 (1) At predetermined time intervals (for instance, every 30 minutes and every 1 hours, etc.) under the operation mode in which the beacon (RB) from the access point 20 can be received;
- 10 (2) When there is no change during a predetermined time period when the reception environment of beacon (RB) changes;
- 15 (3) At predetermined time intervals (for instance, every ten minutes etc.) by specifying the time zone, and
- (4) Under other conditions.

Next, the system configuration of the above-mentioned personal computer 30 will be explained referring to FIG. 3.

As show in FIG. 3, the personal computer 30 comprises a CPU 101, host bridge 102, main memory 103, display controller 104, system controller 105, hard disk drive (HDD) 106, wired LAN device 107, wireless LAN device 108, BIOS-ROM 110, and embedded controller/keyboard controller IC (EC/KBC) 111 etc.

25 The CPU 101 is a processor provided to control the operation of the computer, and executes the operating system (OS) and various application

programs/utility programs loaded from the hard disk drive (HDD) 106 on the main memory 103. Moreover, the CPU 101 executes a BIOS (Basic Input Output System) stored in the BIOS-ROM 110. The CPU 101 executes 5 a communication control program 130 stored in the main memory 103 according to a predetermined set condition (For instance, at constant time intervals), and executes the application processing (see FIG. 5 and FIG. 7) regarding to the communication service shown in 10 FIG. 5 (the first embodiment) or FIG. 7 (the second embodiment) described later in details.

A communication control program 130 is installed to the personal computer 30 beforehand as one of utility programs. This communication control program 15 130 controls the communication of the corresponding computer, and comprises, for instance, a function to register and store a network setting environment in each use place, such as a house and offices, where the communication environments are different from each 20 other as a communication profile, a function to automatically set a network to an optimal communication environment by using the above-mentioned communication profile, and a function to automatically switch to a wireless network by disconnecting a cable under a wired network connection state. Here, as the 25 above-mentioned communication profile, the following items are selectively settable according to the

communication environment to be used:

- Profile name,
- Comment on profile,
- Icon,
- 5     • Capture item (Internet setting; proxy setting, and start home page, etc., device; wired network device, wireless network device, and infrared device etc., TCP/IP setting; DHCP, IP address, subnet mask, default gateway, DNS server, and WINS server, etc.), and
- 10    • Start program after switching.

In addition, the communication control program 130 has an application function (see FIG. 5 and FIG. 7) concerning the communication service to memorize and control the finding frequency of communicatable each access point 20, and a function to display various information items concerning the use of each found access point in the display form (which is characterized according to the finding frequency) according to the finding frequency of the corresponding access point 20 at a predetermined time period when the find access point 20 is found. In this case, when the wireless LAN device 108 receives the beacon (RB) from the access point 20, the wireless LAN device 108 acquires the identifier (BSSID/SSID) of the access point 20 where the beacon (RB) has been received. The wireless LAN device 108 registers the found access point 20 (where beacon (RB) is received) on the

database (DB) 31, counts the finding frequency of each registered access point 20, and manages the finding frequency on the database 31. This database 31 is managed on the HDD 106 by the communication control program 130. In addition, when the access point 20 is found, the finding frequency of the found access point 20 is acquired from the above-mentioned database 31 in the first embodiment of the present invention. The specific character (One example is shown in FIG. 1) prepared beforehand is characterized according to the finding frequency of the access point (by changing the font size and the color, etc.) and is displayed on the display unit 32 during the predetermined time period.

In the first embodiment, it is assumed that the communication control program 130 includes the processing routine which creates the above-mentioned specific character. The communication control program 130 which contains the application function according to the communication service can be treated as an individual program.

The host bridge 102 is a bridge device which connects between the local bus of the CPU 101 and the system controller 105. The host bridge 102 incorporates the memory controller for controlling an access of the main memory 103. The display controller 104 controls the display unit (DISP) 32 which uses, for instance, the LCD used as a display monitor of the

computer.

The system controller 105 controls each device on the PCI bus and each device on the ISA bus. In addition, the system controller 105 incorporates the IDE controller to control the HDD 106. The HDD 106 memorizes the database (DB), which achieves the application function concerning the communication service and which is managed by the communication control program 130.

The wired LAN device 107 is a wired network device to connect the device with the wired network. The wired LAN device 107 communicates with the wired network through the wired LAN cable connected with the LAN connector 106.

The wireless LAN device 108 is a wireless network device to connect the device with the wireless network and has a base band unit and an RF unit. The RF unit transmits and receives the wireless signal via the antenna (ANT) 109. The wireless LAN device 108 performs the wireless communication, for instance, according to the IEEE 802.11a/IEEE 802.11 standard. In the embodiment, the wireless LAN device 108 notifies the CPU 101 when receiving the beacon (RB) sent from the access point 20.

The embedded controller/keyboard controller IC (EC/KBC) 111 is a one-chip microcomputer in which the embedded controller for the electric power control and

the keyboard controller to control the keyboard 13 are integrated. The embedded controller/keyboard controller IC (EC/KBC) 111 has a function of performing the power-on/power-off of the computer according to the 5 operation of the power button by the user.

FIG. 4 shows a configuration of the database 31 managed by the communication control program 130 according to the first embodiment of the present invention. The database according to the first 10 embodiment is shown with a reference numeral of 31(A). In the first embodiment, an identifier (SSID/BSSID) of the found access point 20 and the finding frequency (counter) are associated and memorized in the database 31 under the control of the CPU 101, and are managed by 15 the management number (No.). A specific character for presenting the found access point 20 to the user is generated by the software processing by the communication control program 130 as mentioned above. A plurality of character data corresponding to finding 20 frequency may be memorized in the main memory 103 or the HDD 106 beforehand.

FIG. 5 shows the processing procedure in the first embodiment of the application processing according to the communication service in the communication control program 130. 25

In the application processing concerning the communication service in the first embodiment, the CPU

101 executes the application processing concerning the communication service shown in FIG. 5 which is included in the above-mentioned communication control program 130 at a predetermined time intervals. In this processing, when the wireless LAN device 108 receives the notification of receiving the beacon (RB) sent from the access point 20 in a certain wireless LAN access area (for instance, wireless LAN access area A) (step S11 of FIG. 5), the CPU 101 acquires the identifier (SSID/BSSID) of the found access point 20 according to the corresponding beacon (RB) (step S12 of FIG. 5). If the identifier of the corresponding access point 20 has already been registered in the database 31(A) shown in FIG. 4, the counter of the access point 20 is incremented and the finding frequency is updated. On the other hand, if the identifier (SSID/BSSID) of the found access point 20 is not registered in the database 31(A), the identifier of the found access point 20 is registered in the database 31(A). In this case, the finding frequency "1" is set to the counter which counts the finding frequency (step S13 of FIG. 5). In addition, when the access point 20 is found, the CPU 101 characterizes, for instance, the specific character shown in FIG. 1 prepared beforehand according to the count value of the database 31 (according to the finding frequency of the access point) and displays the character on the screen of the display unit 32 at

a constant time period (step S14 of FIG. 5).

For instance, the size of the display character (for instance, information window) is changed step by step according to the finding frequency of the access

5 point. Or, the display color of the display character is changed step by step according to the finding

frequency of the access point. Or, different

characters in each of two or more steps corresponding to the finding frequency of the access point are

10 prepared, and the characters to be displayed are

switched according to the finding frequency of the

access point. In addition, the displayed character is defined as an operation icon, and supports the

switching of the setting to the optimal communication profile which suits a current communication environment along with the operation of the corresponding icon.

With the application processing function according to such communication service, in each communication environment area to be used usually, the current

20 communication environment and various service

information, etc. can be provided to the user before the network connection, in addition, it is also

possible to present original information individually in each wireless LAN access areas A, B, and C by

25 changing the set finding frequency for each wireless

LAN access areas A, B, and C. An example is shown in

FIG. 8A and FIG. 8B. In this example, the switch

operation button is provided to the information window, and when the switch operation button is clicked, the switching to the profile of the service provider is started. The example of providing different characters step by step is shown in FIG. 9A and FIG. 9B according to the finding frequency of the access point 20.

5 FIG. 9A is an example when service information is changed step by step according to the finding frequency of the access point 20. FIG. 9B is an example of the character which grows up according to the finding 10 frequency of the access point 20.

The second embodiment of the present invention will be explained referring to FIG. 6 and FIG. 7. In the second embodiment, the above-mentioned personal 15 computer 30 downloads the database 31 to achieve the application function concerning the communication service to the predetermined storage area beforehand through the above-mentioned communication network for above-mentioned each of wireless LAN access areas A, B, 20 and C or specific wireless LAN access areas which are communicable. When finding the access point 20 in the wireless LAN access area, the personal computer 30 acquires information associated with the access point 20 from the above-mentioned database 31, and 25 characterizes the corresponding information according to the finding frequency of the above-mentioned access point and displays it during the predetermined time

period. In the second embodiment, as shown in FIG. 6, the database 31 memorizes the condition and information setting what information is displayed at what condition, in addition, to the identifier (SSID/BSSID) and the counter, which counts the finding frequency, by associating them. The concrete example of this condition etc. will be described later.

5 FIG. 7 shows the procedure of the application processing relating to the communication service in the 10 second embodiment of the present invention.

In the application processing concerning the communication service in the second embodiment, when the wireless LAN device 108 receives the notification of receiving the beacon (RB) sent from the access point 15 20 in a certain wireless LAN access area (for instance, wireless LAN access area A) (step S21 of FIG. 7), the CPU 101 acquires the identifier (SSID/BSSID) of the found access point 20 according to the corresponding beacon (RB) (step S22 of FIG. 7). If the identifier of 20 the corresponding access point 20 has already been registered in the database 31(B) shown in FIG. 6, the CPU 101 increments the finding frequency and updates the counter of the access point 20 (step S13 of FIG. 5). If the identifier (SSID/BSSID) of the found 25 access point 20 is not registered in database 31 (B), the CPU 101 invalidates the identifier of the found access point 20, or registers it to the database 31(B)

and performs the same service as that of the first embodiment.

In addition, the CPU 101 acquires the finding frequency, the condition, and the display information, etc. associated with the access point 20, if the found access point 20 is registered in the above-mentioned database 31(B) when finding the access point 20. Then, the CPU 101 compares the conditions (step S24 of FIG. 7), characterizing the corresponding display information according to the finding frequency if the conditions are matched, and displays it on the screen of the display unit 32 during the predetermined time period (step S25 Yes of FIG. 7 and S26). For instance, when the period is set (defined) in the condition, if the present found access point 20 is within the set period, the CPU 101 characterizes the corresponding display information on the database 31(B) according to the finding frequency and displays it on the screen of the display unit 32. The information used for the condition comparison is performed by using, for instance, the date information managed by the computer 30. The similar display as mentioned above is performed when the time zone, morning/afternoon, week, day of the week, and seasons, etc. are set. When the service type, the advertisement type, and the advertisement type, etc., corresponding to the finding frequency are set as the condition, the service

information, advertisement information, and  
advertisement information, etc. whose display forms are  
changed according to the finding frequency, in addition  
to contents, can be displayed on the screen of the  
display unit 32. An example is shown in FIG. 9A and  
5 FIG. 9B, respectively. FIG. 9A is an example when the  
service information is changed step by step according  
to the finding frequency of the access point 20.  
FIG. 9B is an example of the character, which grows up  
10 according to the finding frequency of the access  
point 20. The abovementioned information presentation  
is an example. It is possible to provide the various  
information such as information concerning the  
maintenance, various guide information.

15 As mentioned above, according to the present  
invention, the type of the found access point etc. can  
be easily identified and can be informed to the user  
when the access point is found. In addition, the  
information processing device to expand a useful  
20 function by recording and controlling the found access  
point can be provided.

Additional advantages and modifications will  
readily occur to those skilled in the art. Therefore,  
the present invention in its broader aspects is not  
25 limited to the specific details, representative  
devices, and illustrated examples shown and described  
herein. Accordingly, various modifications may be made

without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.